

MONITORING THE MESOAMERICAN BIOLOGICAL CORRIDOR: A NASA/CCAD COOPERATIVE RESEARCH PROJECT

Year 2 Progress Report Submitted to NASA-ESE by

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Abstract

To foster scientific cooperation under a Memorandum of Understanding between NASA and the Central American countries, the research project is developing regional databases to monitor forest condition and environmental change throughout the region. Of particular interest is the Mesoamerican Biological Corridor (MBC), a chain of protected areas and proposed conservation areas that will link segments of natural habitats in Central America from the borders of northern Columbia to southern Mexico. The second year of the project has focused on the development of regional satellite databases (JERS-1C, MODIS, and Landsat-TM), training of Central American cooperators and some preliminary forest cover and change analysis. The three regional satellite mosaics, available for the first time, will be used in next phase of research to generate forest and land cover maps. Following the validation stage, the regional data will be analyzed to examine forest fragmentation and forest cover change along the MBC. Forest biomass studies will be conducted in selected study sites to test combined radar (JERS, Radarsat) and optical data (Landsat-TM , ASTER, Ikonos) capabilities to detect second-growth forest and estimate above-ground biomass.

Keywords:

Research Fields- deforestation, land cover classification, habitat fragmentation

Geographic Area/Biome- Central America, humid tropical forest

Remote Sensing- Landsat, SAR, MODIS

Methods/Scales- data fusion, integrated assessments, regional scale

Questions, Goals, Approaches

Scientific Question Addressed: What are the changes in land cover/land use?
(forest monitoring and mapping)

Proportion of Social Science: 0

GOFC Forest Themes: Map/monitor-50%, change-25%, other (training)-25%

Goals: Develop regional satellite databases for Central America to map and monitor forest cover , forest fragmentation and change along the Mesoamerican Biological Corridor. Develop research partnerships with Central American counterparts.

Timeline for year 2:	2000	2001
Regional satellite mosaic	J J A S O N D	J F M A M
JERS	-----	
MODIS		-----
Landsat		-----
Digital elevation data		-----
Forest cover and change detection	-----	
Training/workshop development	-- ----	---
Web site/information system	-----	---

Accomplishments: * Three training/workshops conducted in Central America
* JERS, MODIS, and Landsat-TM regional mosaics available for the first time for Central America
* Preliminary analysis of forest cover and change indicate that forest cover is higher, forest change is lower inside the corridor units than outside. Forest clearing rates appear to be lower (based on 26% sample) than 1980 rates reported by FAO.

Gaps/Issues: 1. Optical data acquisition for regional mosaics (Landsat and MODIS) are hampered by clouds in Panama and eastern Honduras ,especially. The de-commissioning of Landsat-5 will not help. We will merge the JERS and Landsat data to complete the forest/nonforest maps in cloud covered areas.

2. There are institutional barriers in getting our CCAD country cooperators working with us as true research partners. For example , government agency technicians (rather than university researchers) have been appointed as our working partners. There are also equipment and software limitations. Despite the fact that we have an MOU, the cooperators cannot seem to perform some routine analysis tasks or get release time from their employers without significant bureaucratic intervention for each request. We need CCAD cooperation for validation activities and will make the point strongly at our meetings (during the June NASA Delegation visit) in El Salvador.

Narrative on Progress:

The research team has invested a lot of time in regional database and product development and training activities in year 2. In June 2001, a NASA Delegation (including the Associate Administrator) will be meeting with Central America Ministers of Environment, other top level officials and researchers to discuss progress and cooperation on the NASA/CCAD MOU. We will deliver a CD-ROM containing the three regional mosaics and other research products. We have experienced delays in receiving JERS data from Alaska SAR Facility and NASDA, and due to the problems with the radiometric calibration and errors in registration, the development of the radar mosaic required more time and man power. We are a little behind schedule on developing the regional land cover map, and hence, the validation activities. However, we now have sufficient data sets in place to move into mapping and validation phases. We are initiating the second growth forest biomass studies in Northern Guatemala and will test the merged radar and optical data sets at a Costa Rica study site in year 3. A preliminary analysis of forest cover and change along the MBC has produced some interesting results relevant to the conservation issues facing the MBC. We will be continuing and expanding this analysis. Manuscripts will be prepared for submission to peer-reviewed journals after we complete validation work in late summer 2001.

- New Findings – nothing to report this period
- New Potential - nothing to report this period
- New Products
 1. JERS-1C mosaic (late 1996) at 100m rectified to 3 arc-second DEM for Central American region.
 2. MODIS mosaic (2001) at 250m for Central American region.
 3. Landsat-TM mosaic (late 1980's to early 1990's). Note that this comes from the NASA Scientific Purchase Databuy (EarthSat) database but we produced the mosaic (TM 3,4,5) at 250m rectified to the DEM.
 4. A CD-ROM containing the three mosaics and other research products to be delivered by the NASA Delegation to Central America in June.

Conclusion:

The project contains a major political component that is unusual from our experience on NASA research grants. Some obstacles to developing effective research cooperation with CCAD team were mentioned earlier. We have fulfilled our training obligations (4 workshops, including 3 in the second year), however one more will be needed to engage the CCAD cooperators in map validation activities. It seems likely that we will need to request a time extension beyond June 2002 to complete all of the proposed work. NASA management should be aware that the research project was funded for 3 years but the MOU extends five years. Some plans for research cooperation beyond year 3 should be considered for continuity and fulfillment of the MOU intent.



Figure 1. JERS 250m Mosaic of Central America.

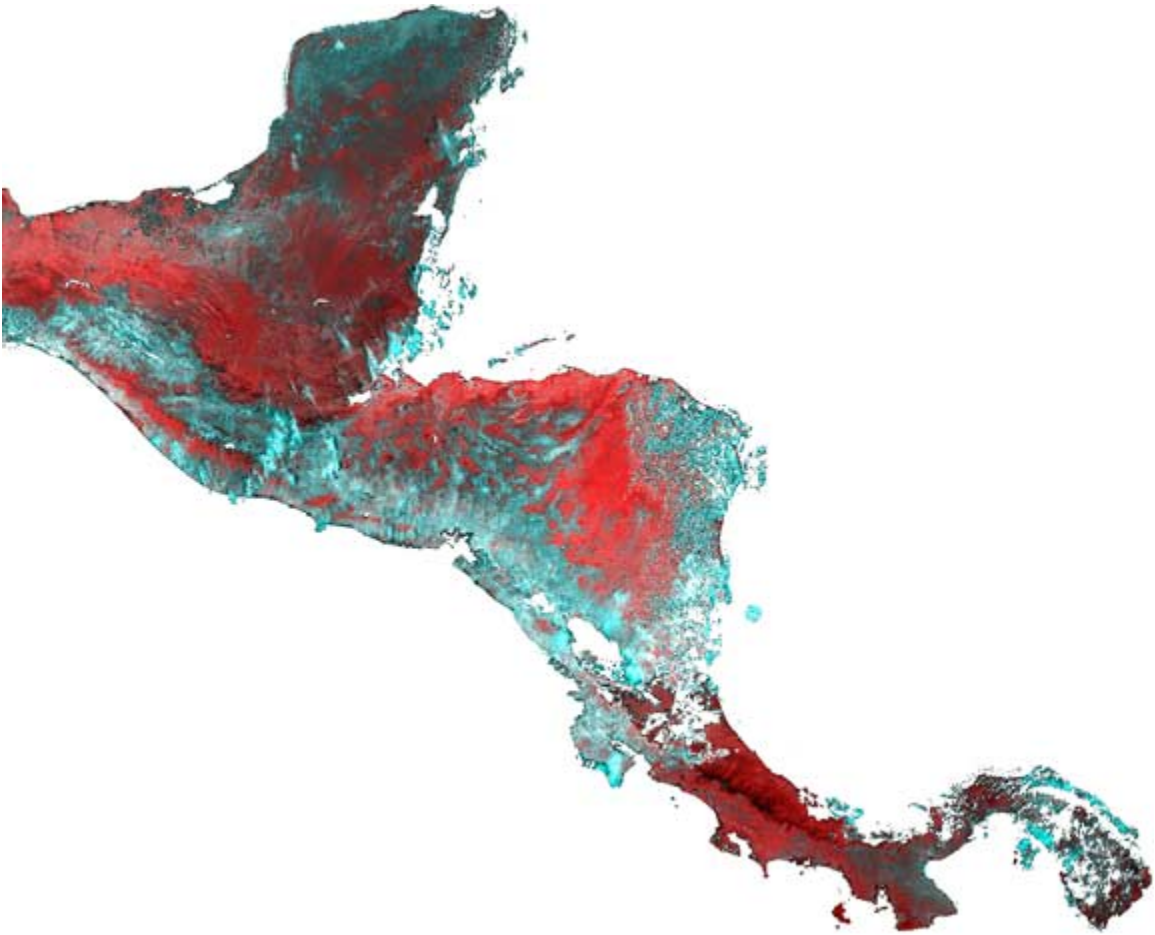


Figure 2. MODIS 250m Mosaic of Central America.

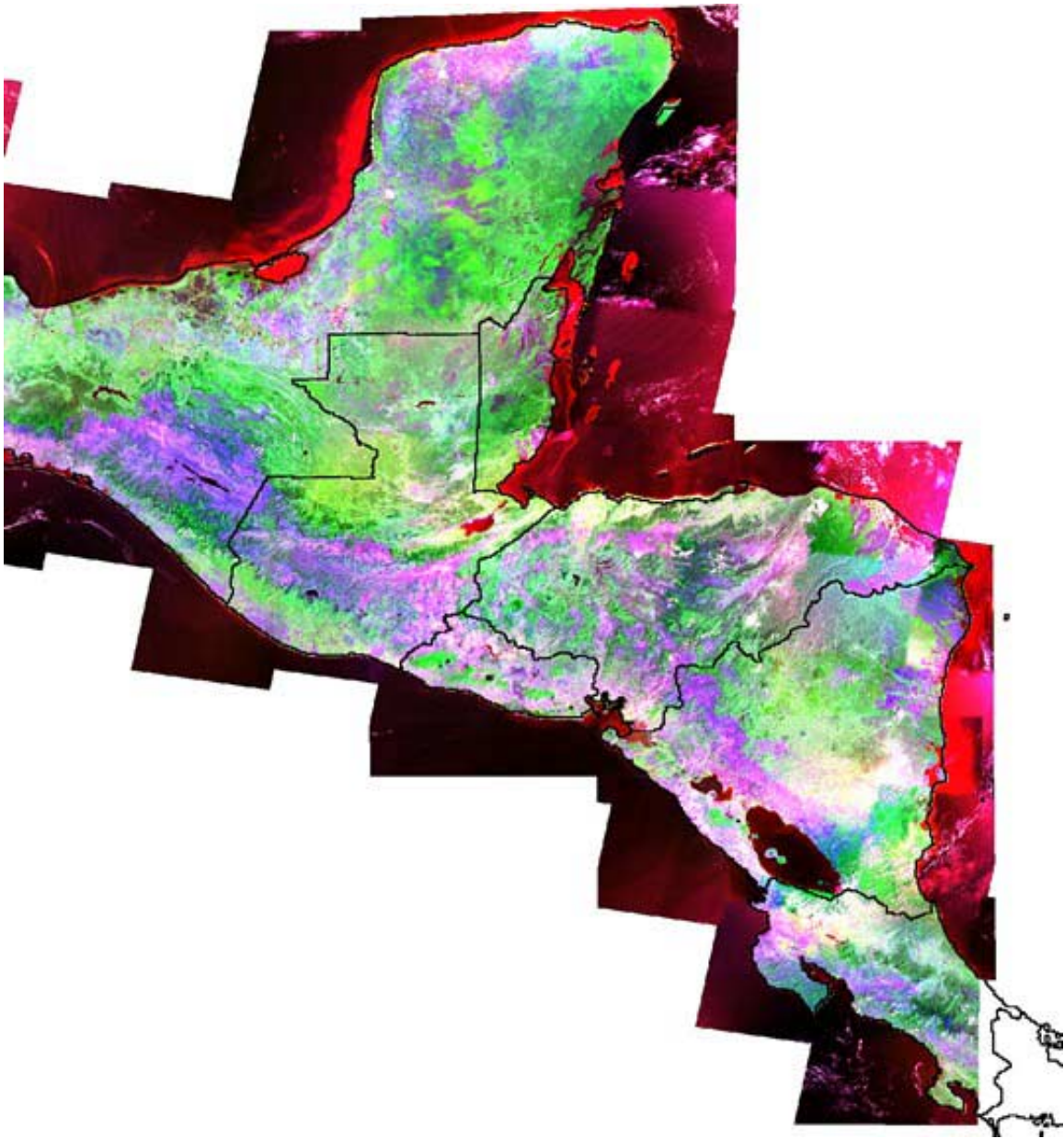


Figure 3. Landsat – TM 250m Mosaic of Central America.